DOCUMENT RESUME

ED 236 611 CS 207 669

AUTHOR Ettema, James S.
TITLE Information Equity and Information Technology: Some Preliminary Findings from a Videotex Field Trial.
SPONS AGENCY National Science Foundation. Washington, D.C. Div. of Information Science and Technology.
PUB DATE Aug 83
GRANT IST-8212164
NOTE 35p.; Paper presented at the Annual Meeting of the Association for Education in Journalism and Mass Communication (66th, Corvallis, OR, August 6-9, 1983).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Banking; *Communications; Cost Effectiveness; Farmers; Home Programs; *Media Research; Online Systems; Program Effectiveness; Technological Advancement; *Use Studies; *Videotex
IDENTIFIERS *Media Use; *User Benefits

ABSTRACT

A study was conducted to determine who, within a target user group, used and benefitted from a videotex system. The subjects were large-scale farmers who agreed to have videotex terminals installed in their homes to receive a wide range of informational and commercial transaction services provided by a bank holding company. At the end of an eight-month trial period, the users received questionnaires that elicited information about the benefits of the system. Demographic data were also collected. Analysis of the 139 responses revealed a number of findings, among them that demographic and other factors studied did not powerfully determine benefits. Age made a difference in who received the business-oriented benefits, and income and innovations adopted also made a difference for certain benefits. A negative and significant correlation between communication behaviors, particularly newspaper use, and various benefits suggested that the system filled a niche not occupied by other media. Analysis also revealed positive relationships between self-reported information needs and certain benefit indicators. (Extensive tables of data are appended.) (FL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED236611

INFORMATION EQUITY AND INFORMATION TECHNOLOGY
Some Preliminary Findings from a Videotex Field Trial

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
[X] This document has been reproduced as received from the person or organization originating it.
[ ] Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

by

James S. Ettema
School of Journalism and Mass Communication
University of Minnesota

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
James S. Ettema
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

The research reported here was supported by Grant No. IST-8212164 from the Division of Information Science Technology of the National Science Foundation. This paper was presented to the Communication Theory and Methodology Division of the Association for Education in Journalism Annual Convention, Corvallis, Oregon, 1983.

CS 207669

INFORMATION EQUITY AND INFORMATION TECHNOLOGY

Rapidly developing information technologies have conjured up for some observers visions of multi-service, interactive information utilities (e.g. Dordick, Bradley and Nanus, 1981; Williams, 1982). The envisioned systems would be readily available and widely used by the public for news, business information, entertainment, education, home shopping and financial transactions (Madden, 1981). The envisioned social impact of all this has often been positive indeed:

> New technologies will extend information resources to the places they are needed, when they are needed, in a form that is tailored to the user's needs and skills levels. Compared to traditional media or libraries, the effort of searching and selecting out pertinent information in a form that can be used and understood will be greatly improved. (Martin and Norman, 1970)

> The level of information, hence life quality, will be enhanced throughout all sectors of society. Widely available, low cost information resources will bring a uniformity of access which significantly surpasses present technologies. There is in this at least the suggestion that especially the informationally and educationally disadvantaged will gain because of these innovations. (Chen, 1977)

These authors envision potential social benefits arising from benefits to individual users. According to Martin and Norman, information technology will provide not only more information but more readily accessible and useful information for everyone. In turn, according to Chen, this technology will help reduce the difference between the information "haves" and "have nots." The vision here is, then, of more equitable information distribution within society.

Bowes (1980) cites both of these passages to acknowledge the attractiveness of the visions they represent but he hastens on to "provide a somber contretemps to the enthusiasm over advances in information technologies." (p. 52) He argues that the available

evidence does not support the vision of enhanced information equity, a point also made by Paisley et al (1979):

> In the "knowledge society" of contemporary America resources and power accrue to those who have information. It is no less true that information accrues to those who have resources and power...We may be optimistic about the long-term effects of community information networks, cable television information services, home computers, etc, but thus far the introduction of new communications technology has widened rather than narrowed the gap between the information "haves" and "haves nots." (p. 1)

Except, perhaps, for the issue of productivity, the issue of equity is the most critical concern raised by new information technologies. It is important, therefore, to understand that the issue of information equity has at least two aspects or levels. At the most fundamental level, the issue of information equity focusses attention on the question of which segments of society have had information systems created to serve their needs. Most existing information systems are decision support or information retrieval systems created to serve the needs of professionals or other highly specialized workers. MEDLINE for physicians, LEXIS for lawyers as well as the online versions of Chemical Abstracts and Sociological Abstracts are some well known examples of information retrieval systems created for specific user groups. However, even the information systems designed for more diverse user groups are not designed for everyone. Dow Jones News/Retrieval, for example, was created to serve much the same financial and business user group served by that firm's "old technology" information system, the Wall Street Journal. Similarly, Knight Ridder's Viewtron videotex system was, of course, created to serve the interests (if not needs) of the urban, upscale segment of society with the disposable income to pay for the service. At this level, then, the issue of information equity

concerns whose needs and interests are served--and not served--by the existing array of information systems.

At the next level, the issue of information equity focusses attention on who, within the designated user group, actually uses and benefits from a particular system. A generation of mass communication research has shown for example that within the designated user group for newspapers, not every one is equally well served. The better educated use newspapers more (e.g. Robinson, 1972) and also enjoy more of the benefits of use such as information acquisition. (Clarke and Kline, 1974). The implication of this research is summarized in the "knowledge gap hypothesis:"

> "As the infusion of mass media information into a social system increases segments of the population with higher socio-economic status tend to acquire this information at a faster rate than the lower status segments, so that the gap in knowledge between these segments tends to increase rather than decrease." (Tichenor, Donohue and Olien, 1970, p. 160).

Proposed explanations for gap phenomena have included lack of "communication skills", inability to see problems solutions in informational terms and other such "deficits" arising from lack of education. Most recent explanations, however, have emphasized the idea that gaps are due less to deficits than to differences among users in motivation to acquire the sort of information offered by newspapers or other information systems (Ettema and Kline, 1977). Motivation, in turn, is traced to the ability of the information offered by a system to solve the problems and meet the needs of users. (Devin, 1980; Brown, Ettema and Luepkar, 1981) Thus the less educated, though part of the newspaper user group, may use the newspaper less and learn less from it because that system does not

serve their interests very well. Building on these ideas Dervin (1980; Dervin et al, 1980) has urged attention to more adequately diagnosing the specific information needs of individuals as a first step in understanding communication behavior undertaken and benefits received.

Applying these ideas to the newer information technologies leads us to look, within user groups for differences in use and benefit. To understand more precisely WHO uses and benefits from the system these ideas lead us to look for money, power, status and other resources as correlates of use and benefit. Thus, for example, research on which law firms use and benefit from LEXIS would, no doubt, employ a variety of organizational variables while a study of a system designed for a more diverse user group would use demographic variables much as newspaper research has done.

The ideas reviewed above also lead us to look for differences within user groups based on self-described information wants and needs. And it is at this point that the issue of information equity shades into the issue of productivity. That is, to really enhance the life and work of users, systems must be created to meet the needs of users as the users themselves understand those needs. Systems ought not discriminate against those with few resources but, on the other hand, they ought to do something worthwhile.

One example of research on who uses and benefits from a particular information system is the evaluation of the "Green Thumb" videotex service which provided agricultural and home economics information to a number of Kentucky farmers. In this research Rice and Paisley (1982)[1] found that even among the farmers the system was

1. Case et al (1981) provide a full length technical report on this research.

created to serve, use and self-reported benefits varied a good deal. They also found that use and benefits were, to some extent, related to demographic and self-reported information need variables though the relationships were not strong. They conclude:

> Like other channels of agricultural information, Green Thumb has a small group of heavy users and a large group of light users. It is not likely that any change in Green Thumb's content or mode of presentation would have altered this pattern of use. Bivariate analysis implied that farmers who operated large farms, who stated that marketing information was very important in the operations, and those who had adopted several agricultural innovations were significantly heavier users of Green Thumb than other farmers...Overall, multivariate analysis explained little variance (20-30%), indicating that usage of such a system is not much determined by demographic and economic situations...(pp.232-3).

The authors draw similar conclusions in regard to self-reported benefits of system use. This research thus suggests that the assumption of equal use and benefit could not be met for this particular system though it is not clear exactly how to define the groups who used the system and benefitted from it the most.

SETTING OF THE CURRENT RESEARCH

The opportunity to further examine the ideas reviewed above in the setting of a videotex information system was presented by the field trials of an experimental system developed by a bank holding company in the Midwest. The system was designed to offer a wide range of informational and commercial transaction services specifically to farmers. These services included:

> Agricultural markets. Regional and national commodity prices along with market analysis and forecasts were provided and regularly updated by an agricultural information broker.
>
> Agricultural news. Agricultural-related news from Washington and other locations was provided also by the information broker.

General news. Regional and local news edited with a farm audience in mind was provided by a regional daily and two small daily papers serving the trial communities.

Weather. Regional and local weather reports and forecasts were provided the regional daily while national and international weather reports and long-range forecasts were provided by the agricultural information broker.

Home Information. Health, cooking and other household information was provided by the state Agricultural Extension Service.

Shopping Information. Advertising and sale information was provided by a number of local and regional merchants.

Community events. Community events calendars were assembled and updated by newspapers.

Financial services. Though not available to all users, the system offered electronic funds transfer and accounting services through the local affililates of the bank holding company.

In the eighth month trial which was recently completed, videotex terminals were installed in the homes of 188 large-scale farmers in three rural communities which the system operator determined represented the target market for the service. While not without technical problems and slowness in information updating, much like those experienced by the "Green Thumb" system, this system did survive the trial period to be sold by the bank holding company to a national retailer for development as a nationwide informational and transactional system. All in all, the system was a reasonable prototype for the information utility often envisioned as the application of videotex technology. The current research seeks to describe who, within the target user group, used and benefitted from this system as well as who had problems with it. Following the above discussion, the descriptors employed include a set of demographic variables and a set of self-reported information needs. Additionally, a set of media use variables was employed to assess how use and

benefit from this system compared to other communication behaviors of the users. All in all, this analysis seeks to replicate and extend the Rice and Paisley analysis of which farmers used and benefitted from such a system.

The data reported here were collected primarily in a mail survey of system users conducted near the end of the trial period (December, 1982). Of the 188 user surveys mailed to farmers, 139 (74%) were returned. The benefit measures in this analysis, like the "Green Thumb" analysis, are farmer's self-reports of benefits obtained from use of the service. More specifically, the benefit measures employed here are four multiple-item indices. These were constructed by factor analyzing the 24 survey items which asked respondents to rate the usefulness of the system on a variety of dimensions. Four intercorrelated factors emerged from this analysis. The four indices are, then, the unweighted averages of the items which loaded most heavily on each of the factors (deleting only two items to enhance inter-item reliability and conceptual clarity).[2] The indices and the items which compose them are:

General Benefit Index

> How useful was (the system)in helping you make decisions about marketing your farm products?[3]
>
> How useful was (the system) in helping you actually get higher prices for your farm products?

---

2. Intercorrelations of the indices and inter-item reliability estimates are in the Appendix.
3. The response scale for all items was: 1=not at all useful, 2=slightly useful, 3=somewhat useful, 4=very useful, 5=extremely useful.

How useful was (system) in keeping you up-to-date on farm markets (whether or not you're ready to sell)?

Overall, how useful was (the system) in saving you time and energy?

Overall, how useful was (the system in saving or earning you money?

Overall, how useful was (the system) in keeping you better informed?

Overall, how useful was (the system) in helping you make better decisions?

All things considered, how useful would you say (the system has been to you?

Information-Seeking Value

How useful was (the system) in saving you time and energy by bringing a variety of information together in a single place?

How useful was (the system) in saving you time and energy by making information quickly available whenever you are ready to use it?

How useful was (the system) in saving you time and energy by allowing you to select only the information you want and easily skip over what you don't want?

How useful was (the system) in saving you time and energy by making your search for information more organized?

How useful was (the system) in keeping you better informed by providing more worthwhile information than was available before?

How useful was (the system) in keeping you better informed by provided new and different kinds of information?

Decision-Making Value

How useful was (the system) in helping you make decisions about crop or livestock production?

How useful was (the system) in helping you make various decisions in a more organized and rational way?

How useful was (the system) in helping you make various decisions more quickly?

How useful was (the system) in helping you make various decisions with more confidence that you understand the situation?

Electronic Newspaper Value

How useful was (the system) in keeping you up-to-date on agricultural news?

How useful was (the system) in keeping you up-to-date on other local, national and international news?

How useful was (the system) in keeping you up-to-date on the weather?

How useful was (the system) in keeping you up-to-date on community events such as auctions and school activities?

The three problem measures reported here are single items drawn from the 16 survey items which asked respondent to rate the severity of a variety of potential problems. These problem items were also factor analyzed but the six factors which emerged from that analysis did not yield indices with adequate inter-item reliability or conceptual clarity. Several single items were, therefore, selected for the analysis reported here. These items are:

How much of a problem was getting too much detailed information?[4]

How much of a problem was information written in a way which was not easily understandable?

How much of a problem was using the various indexes to get the pages of information that you wanted?

The system use measures were drawn from use records maintained by the system operator. These records were available for 87 days distributed across the eight months of the system's field trial. These records were aggregated into general content categories, three

[4] The response scale for these items was: 1=never a problem 2=occasionally a problem, 3=often a problem, 4=constantly a problem.

of which are reported here: (1) time spent using news, weather and sports (2) time spent using farm marketing information and (3) time spent using all content categories combined. These records thus serve as estimates of system use throughout the trial period within each of the content categories.

The attempt to understand exactly who used, had problems with and benefited from this videotex system employed variables similar to those in the "Green Thumb" analysis. They were:

Demographics

- Age
- Education
- Family income
- Number of farming innovations adopted

Communication Behavior

- Newspaper use for both agricultural and general news (two item index)
- Radio use for both agricultural and general news (two item index)
- Farm and nonfarm magazine use (two item index)
- Number of personal agribusiness contacts per year (single item)

Self-report Information Needs

- Index of interest in farm market information (seven item index)
- Index of interest in general news (four item index)
- Overall satisfaction with other information sources (single item)

These variables serves as the independent variables in the bivariate and multi-variate analyses which follow.

BENEFIT ANALYSIS

Bivariate Analysis

Descriptive statistics and correlations between the benefit measures and the independent variables are in Table One. These statistics were computed for the 87 system users who used the market information and news services at least once during the 87 system-monitored days. This table shows, first of all, that the means of all four indices fell between "slightly useful" (2) and "somewhat useful" (3). Clearly this prototype videotex system did not prove itself to be indispensible in the course of its eight month trial period. The system was, however, most useful in facilitating information seeking (mean=2.35) by bringing together information in a single place, making information quickly available, allowing the user to easily skip over unwanted information and making the information search more organized as well as simply making new and different information available. On the other hand, the system was least useful in facilitating actual farm decision-making (mean=2.09). This result is not unexpected in light of the fact that the system was an information medium for large farmers in general rather than decision support system for each particular farm and farmer.

Correlations between the four benefit indices and the independent variables are also in Table Three. Beginning with the General Benefit Index it is clear that age was the most strongly related of the demographic variables (r=-.42). Age was also negatively and significantly related to Information-Seeking Value (r=-.43), Decision-Making Value (r=-.30) and Electronic Newspaper Value (r=-.23). Thus it was the younger farmers who consistently tended to report greater benefits from the system. It is also the less well-to-

do farmers who reported greater benefit.

Given the negative correlations between age and reported benefits it is probably not surprising to find positive correlations between number of farm innovations adopted and the General Benefit Index (r=.25), Information-Seeking Value (r=.16) and Decision-Making Value (r=.25). Innovations adopted, however, was weakly but negatively correlated with Electronic Newspaper Value (r=-.13). Similarly, the correlations between education and the General Benefit Index (r=.25), the Information Seeking Value (r=.25) and Decision-Making Value (r=.25), were all positive, and significant. This suggests that even within the upscale target market for this system, education is still a factor in determining who benefits. It is worth noting in this regard that education was essentially unrelated to Electronic Newspaper Value (r=-.06). This suggests that the relationship of education to benefit depends more on the particular sort of benefit than on some inherent feature of the videotex technology.

Turning next to the correlations between communication behaviors and the benefit indices, it is clear that newspaper use for agricultural and general news was significantly and negatively related to the four benefit indices while radio use was negatively related to all but Electronic Newspaper Value. Magazine use and agri-business contacts tended to be negatively related to the benefit indices though the magnitude of those relationships is small and typically nonsignificant for this sample. Overall, then, those farmers who use traditional mass media less--particularly newspapers--tended to report greater benefits.

Turning finally to the self-reported information needs, both the

index of interest in farm market information and the index of interest in news related to the benefit indices in reasonable ways. Interest in news was positively related to Electronic Newspaper Value (r=.32) but was not related to the other, more business-oriented, benefits. Interest in market information, on the other hand, was positively related to the General Benefit Index (r=.25) and Information-Seeking Value (r=.28). Interest in marketing was not related to Electronic Newspaper Value. Finally, overall satisfaction with information sources was weakly but negatively related to the General Benefit Index and Electronic Newspaper Value. Thus farmers who are less satisfied with their traditional sources of information had slight tendency to report greater benefits from this new information source.

To summarize the results of the bivariate analysis, those who benefited from the system clearly tended to be younger. Those who received business-oriented benefits also tended to be better educated farmers on their way up (i.e. more innovative but less well-to-do at this point). The farmers who reported greater benefits of all sorts also use traditional mass media less, perhaps because they are less satisfied with them. However, those who reported greater benefit also tended to report greater interest in various kinds of information which suggests that this system did indeed help meet an information not well met by other media.

Multivariate analysis

To refine the list of variables which best predict benefits by taking into account intercorrelations among those variables, the multivariate technique of stepwise regression was employed. In such an analysis each of the independent variables compete for entry into the equation based on its ability to explain additional variance in

the dependent variable. The lists of variables which did explain significant increments of variance in the four benefit indices are in Table Two.

For the General Benefit Index, age among the demographics explained a highly significant increment of variance. While innovations adopted explained a marginally significant increment. Education, however, could explain no variance beyond these variables though it is likely that at leasts part of the effect of age is due to its correlation with education. In addition to the demographics, newspaper use explained a significant increment of variance and all the independent variables together explained 35% of the variance in the General Benefit Index. As a point of comparison, Rice and Paisley explained 28% of the variance in a similar benefit index using a comparable set of independent variables. In their analysis only age emerged as a significant predictor. Interestingly, age was positively related to benefit in the "Green Thumb" analysis rather than negatively as in the present analysis.

For Information-Seeking Value age and income emerged as a significant predictors. They were joined by agri-business contacts and interest in market information. All the independent variables together explained 38% of the variance in this benefit index. For Decision-Making Value age and income emerged as significant predictors while innovations adopted was marginally significant. All of the independent variables together could account for only 21% of the variance in this benefit. Finally, for Electronic Newspaper Value, innovations adopted, newspaper use and interest in news explained significant increments of variance. All of the independent variables

accounted for 23% of the variance.

Overall, it is clear that demographics, media use and self-reported information needs all can be used to enhance somewhat the picture of who benefits from this videotex system. Age income and innovations among the demographics all prove useful. Younger, less well-to-do but more innovative farms are more likely to receive at least some benefits. thing. Newspaper use is also a predictor of who receives several benefits from this system. The negative relationship between newspaper use and these benefit measures suggests that this system was not adopted by habitual media users as just another information source. Rather the system seemed to better serve the needs of those who, for whatever reason, use traditional media less. Finally, the emergence of interest in market information as a predictor of Information-Seeking Value and interest in news as a predictor of Electronic Newspaper Value reinforces the idea that the system did help meet some real needs even if the average benefit ratings were not particularly high. Thus, for example, those who were more interested in news were morely likely to say that they got it from this source.

PROBLEM ANALYSIS

Bivariate analysis

The descriptive statistics and bivariate correlations for the three problem measures are presented in Table Three. This table shows, first of all, that problems associated with (1) the amount of detailed information provided by the system, (2) the understandability of the information and (3) use of the indexes (or menus) to retrieve that information were NOT particularly severe. For all three potential problems, the average survey response was between "never a

problem" (1) and "occasionally a problem" (2). Users were, then, for the most part able to find, understand and cope with the information provided.

There was, however, some variation on these problem measures and the bivariate analysis indicates who tended to have these sorts of problems. Among the demographic variables only age emerged as a correlate of problems with the system. It is the older farmers who tended to report difficulty using the indexes (r=.33) and that the system provided too much detailed information (r=.21). However, older farmers were not more likely than younger farmers to find the information difficult to understand (r=-.08). Beyond the correlations with age, the most interesting set of correlations among the demographic variables were those with education: education was essentially uncorrelated with finding, understanding or coping with the information provided by the system.

Among the communication behaviors, newspaper use positively and significantly related to the problems of detail (r=.26) and using the indexes (r=.27). Magazine use was positively, related to difficulty using the indexes (r=.24) while agribusiness contacts was related to the problem of understandability (r=.30). In general, then, the more users of this system use other media, the more likely they were to report problems with the system. However, each problem has its own pattern of correlates among the media use variables. Finally, among the self-reported information needs, only satisfaction with other information sources correlated with the problem of understandability (r=.20) at a statistically significant level.

Overall, the relationships between the independent variables and

the problem measures were much less consistently patterned than was the case with the more highly intercorrelated benefit measures. It does seem, however, that older users were more likely to experience at least some of the problems though less well educated users were no more likely to experience problems than others. Perhaps most interestingly, heavier users of traditional media--particularly newspapers--were more likely to experience problems.

Multivariate analysis

The step wise regression analysis of the problem measures is summarized in Table Four. For the problem of too much detail, newspaper use emerged as a variable which explained a significant increment of variance--heavier users had more problems of this sort--while age explained a marginally significant increment. All of the independent variables together explained 18% of the variance in this problem. As a point of comparison, Rice and Paisley explained 26% of the variance in an overall problem measure using the comparable set of variables. For the problem of understanding the information only agri-business contacts, explained a significant increment of variance. All of the independent variables explained 15% of the variance in this problem. Finally, for difficulty using the indexes, age, innovations adopted and newspaper use all emerged as significant predictors and all variables explained 25% of the variance in this problem.

Overall, the regression analysis yielded a diverse set of predictor variables for the problems. Perhaps the most interesting, if not interpretable, result here was that for all three of the problems a communication behavior emerged from the regression analysis as a significant predictor. What it is about those who are heavier newspaper users or what it is about newspaper use itself that

contributed to the problems of coping with detailed information and using the indexes is a worthwhile problem for further analysis.

USAGE ANALYSIS

Bivariate analysis

System-monitored usage records show that farmers' total use of the system averaged 167.78 minutes across the 87 days for which data was available. That's about 13.5 minutes a week. Use of the system for marketing information averaged 35.6 minutes for the 87 days or about 3 minutes per week while use of the system for news average 29.59 minutes for the 87 days or a little more than two minutes per week. This usage is, of course, very low compared to the use of other media but it is important to place average use within the context of the great variation in use among the farmers. Thus while mean total system usage was about 13.5 minutes per week the standard deviation was 16 minutes per week. The variation across farmers is also substantial for both market information and news usage as well.

A good deal of this variation is due to the fact that a number of farmers who had the system available simply did not use it at all or, at least, use it for particular sorts of information. For example, 17 percent (33) of the 188 farmers who had the system available showed no usage of any sort during the 87 monitored days. Twenty-six percent (48) of the farmers showed no usage for market information and 31 percent (59) showed no usage for news. There were, then, a number of farmers who had the system available but were, in fact, nonusers of system or particular services within it. When these nonusers are eliminated average total use of the system rises to 18 minutes per week with a standard deviation of more than 14 minutes per week.

Clearly, then, usage of this new and not fully debugged system was, by comparison to other media, little used on the average. A few farmers, however, made heavy use of it.

The correlates of usage for the 87 users previously analyzed are shown in Table Five. It is clear that the three usage measures show quite different patterns of correlates. For total system use (that is, all services combined) none of the independent variables was signficantly correlated although age (r=-.16) comes the closest. The lack of significant correlates is, perhaps, not surprising given the eclectic collection of services offered by the system and the finding that two of the most used services, market information and news, had quite different patterns of correlates. For market information, age (r=-.25) and family income (r=-.26) are significantly correlated while for news, only innovations adopted (r=-.17) comes close to statistical significance among the demographics. For market information, newspaper use (r=-.21) is significantly correlated but for news no communication behaviors are significantly correlated. Finally, for market information, no self-reported information needs are significantly correlated although interest in market information comes closest (r=.16). For news, however, interest in news is positively and significantly correlated (r=.32).

Multivariate analysis

The step wise regression analysis for the usage variables is summarized in Table Six. For total use of the system, no variable emerged as a significant predictor and all of the independent variables together, could account for only 9% of variance in total usage. For use of the system for market information, age, income and

agri-business contact were significant predictors. Nineteen percent of the variance could be explained. Finally, for use of the system for news, innovations adopted and interest in news were significant predictors Here 18% of the variance could be explained. Overall, the particular predictors which emerged from this regression analysis seem much less interesting and important than the fact that use of the system lent itself much less readily to explanation than did the benefits obtained from that use.

THE RELATIONSHIP OF USE AND BENEFIT

The realtive inability of the independent variables to predict system- monitored usage as compared to self-reported benefit raises the question of the relationship between use and benefit. It is reasonable to assume that greater use of the system translates into greater benefit, yet we can say more about who benefits than about who uses the system. How is it that farmers who are younger, better educated and lighter newspaper users report more benefits but don't seem to use the system any more than others? Does use really translate into benefit afterall?

In an attempt to understand more about the relationship between use and benefit, further stepwise regression analyses of the benefit measures were undertaken. In these analyses, an appropriate usage variable along with the other independent variables was allowed to compete for entry into the equation. The results of these analyses are presented in Table Seven.

Beginning with the General Benefit Index, use of the system for market information did emerge as a significant predictor of this benefit. Alone usage accounted for about 19% of the variance in

benefit. However, age, and newspaper use still emerged as significant predictors as well. The picture was very much the same for Information-Seeking Value. Use alone accounted for 16% of the variance while age, and agri-business contacts confirmed to explain significant increments of variance in this benefit. For Decision-Making Value, use of the system for market information once again was the best predictor while age emerged as a significant predictor. The last benefit measure, Electronic Newspaper Value, breaks this pattern, however. Use of the system for news did not account for significant variance although innovations newspaper use and interest in news all continue to do so.

This analysis indicates that for the business-oriented benefits, at least, use did translate into benefit but only to a limited extent. At best, use accounted for 19% of the variance in benefit. This was highly significant statistically but, of course, left 81% of the variance in benefit unexplained. And for Electronic Newspaper Value use did not translate into benefit at all.

One interpretation of these results, an interpretation which also acknowledges the low average usage levels of the system, holds that amount of use may be only loosely coupled to benefit due to the nature of the information system itself. After all, an important reason for the system's existence is that it makes exactly the information desired (e.g. the price of a particular commodity in a particular market) available to the user nearly instantly. It is quite possible that some farmers used the system for very brief periods and still found it quite beneficial. Other farmers may have used the system for longer periods but found it less beneficial due, perhaps, to problems

with the system or other hinderances. A brief time spent with the system to obtain the benefits would, then, itself be a benefit.

The idea that use does not somehow automatically translate directly into benefit also accounts for the fact that the demographic and media use variables accounted for significant variance in benefit beyond that explained by use. The other significant predictors could, then represent factors which facilitate or hinder the translation of use into benefit. Thus, for example, age, for a variety of reasons, could hinder the process. Lighter use of other media, on the other hand, could create an information need which the system is able to fill to some extent.

SUMMARY AND CONCLUSION

The videotex information system under study here was designed to serve large-scale farmers in the Midwest. The study thus focussed on who, within this designated user group, was best served by the system. Based on the results we must conclude, much as did Rice and Paisley who studied a similar system, that benefits are not powerfully determined by demographic and other factors studied here. The variance in benefit explained was near in magnitude to that explained in Rice and Paisley analysis (20-40%). However, several variables did emerge as significant predictors and it is important not to dismiss these results too readily.

Age did make a difference in who received the business-oriented benefits and what it is about age that does make a difference demands further analysis. Income and innovations adopted also make a difference for certain benefits.

Perhaps the most interesting and surprising result which emerged from the analysis was the negative and significant correlation between

communication behaviors, particularly newspaper use, and various benefits. This suggests that the system, perhaps because of its technological attributes, fills a niche not occupied by other media. The system may, then, be of real value to those with little time or opportunity to use other, traditional media.

The analysis also revealed positive relationships between self-reported information needs and certain of the benefit indices. This can be interpreted as a favorable evaluation of the system--those who said they wanted something were more likely to say they got it. However, the low mean ratings of the system on each of the benefit measures, suggests that the system has far to go before it becomes an indispensible information source for these users.

Finally, the analysis of who is best served by this system revealed that use was a significant predictor of benefit though even here the explained variance was less than massive. These results urge attention to the assumption that increased use necessarily translates into increased benefit. While the use of traditional media such as newspapers is probably less than tightly coupled to benefits such as increased public affairs knowledge (Clarke and Kline, 1974), it may well be that use of newer media s ch as this videotex system is loosely coupled to benefit, in part, because of the technology itself. Some farmers may find that brevity of use is in itself a benefit. This idea, along with the negative correlations between benefits from this system and use of traditional media, suggests that--low and behold!--the new technologies really may be new in useful ways after all.

REFERENCES

Bowes, J.E. (1980) "Mind vs. Matter--Mass Utilization of Information Technology." In Dervin, B. and M.J. Voigt (eds.) Progress in Communication Sciences. Vol III. Norwood, N.J.: Ablex.

Brown, J.W., J.S. Ettema and R.V. Luepker (1981) "Knowledge Gap Effects in a Cardiovascular Information Campaign." Paper presented to the annual convention of the Association for Education in Journalism, East Lansing, Michigan.

Case, D., M. Chen, H. Daley, J. Kim, N. Mirshra, W. Paisley, R. E. Rice and E.M. Rogers (1981) Stanford Evaluation of the GREEN THUMB BOX Experimental Videotex Project for Agricultural Extension Information Delivery in Shelby and Todd Counties, Kentucky. Washington D.C.: National Technical Information Service.

Chen, T.C. (1977) "Computing Power to the People: A Conservative Ten-Year Projection." In Seidel, R.J. and M.L. Rubin (eds.) Computers and Communication: Implications for Education. New York: Academic Press.

Clarke, P.C. and F.G. Kline (1974) "Media Effects Reconsidered: Some New Strategies for Communication Research." Communication Research 1:224-240.

Dervin, B. (1980) "Communication Gaps and Inequities: Moving Toward a Reconceptualization." In Dervin, B. and M.J. Voigt (eds.) Progress in Communication Sciences. Vol. III. Norwood, N.J.: Ablex.

Dervin, B., S. Harlock, R. Atwood and C. Garzona (1980) "The Human Side of Information: An Exploration in a Health Communication Context." In Nimmo, D.(ed.) Communication Yearbook 4. New Brunswick, N.J.: Transaction Books.

Dordick, H.S., H.G. Bradley and B. Nanus (1981) The Emerging Network Marketplace. Norwood, N.J.: Ablex.

Ettema, J.S. and F.G. Kline (1977) "Deficits, Differences and Ceilings: Contingent Conditions for Understanding the Knowlege Gap." Communication Research 4:179-202.

Madden, J.C. (1981) "Prospects for Videotext and Teletext." In Moss, M.L. (ed.) Telecommunications and Productivity. Reading, MA.: Addison Wesley.

Martin, J. and A.R.D. Norman (1970) The Computerized Society. Englewood Cliffs, N.J.: Prentice Hall.

Paisley, W., M. Butler and K. Cirksena (1979) "Conceptualization of Information Equity Issues in Education." Paper presented to the Conference on Information Equity In Education, Washington, D.C.

Rice, R. and W. Paisley (1982) The Green Thumb Videotex Experiment: Evaluation and Policy Implications" Telecommunications Policy 6:223-235.

Robinson, J. (1972) "Mass Communication and Information Diffusion." In F.G. Kline and and P.J. Tichenor (eds.) Current Perspective in Mass Communication Research. Beverly Hills: Sage.

Tichenor, P.J., G.A. Donohue and C.N. Olien (1970) "Mass Media and Differential Growth in Knowledge." Public Opinion Quarterly 34: 158-170.

Williams, F. (1982) The Communications Revolution. Beverly Hills: Sage.

APPENDIX

Intercorrelations and Inter-Item Reliabilities (Alphas) of Benefit Indices

	General Benefit Index	Information-Seeking Value Index	Decision-Making Value Index	Electronic Newspaper Value Index
	Alpha = .92	Alpha = .93	Alpha = .89	Alpha = .76
G.B.I.	1.00	.73	.76	.41
I-S Value		1.00	.65	.45
D-M Value			1.00	.33
E.NP Value				1.00

TABLE ONE

Correlates (Pearson r) of Self-Reported Benefits

	General Benefit Index	Info-Seeking Value Index	Decision-Making Value Index	Electronic Newspaper Value Index
	Mean = 2.40 S.D. = 0.83 N = 87*	Mean = 2.85 S.D. = 0.94 N = 87	Mean = 2.09 S.D. = 0.80 N = 87	Mean = 2.42 S.D. = 0.81 N = 87
Demographics				
Age	-.42**	-.43	-.30	-.23
Family Income	-.30	-.31	-.28	-.16
Innovations	.25	.16	.25	-.13
Education	.25	.25	.25	-.06
Communication Behavior				
Newspaper use	-.29	-.25	-.21	-.20
Radio use	-.24	-.14	-.23	-.01
Magazines	-.18	-.13	.00	-.15
Agri-business contacts	-.02	-.13	.05	-.06
Information Needs				
News interest	.09	.13	.09	.32
Market information interest	.25	.28	.11	.04
Satisfaction with other sources	-.10	-.04	-.04	-.12

** Statistics have been computed for the 87 respondents who showed at least one use of the news and market information services during the 87 system-monitored days.

* For n=87, statistical significance at the .05 level requires r=.18

TABLE TWO

Summary Stepwise Regression Results for Benefits

Benefit Index	Significant Predictors (Increment to variance explained)	R^2 and P-value of overall equation
General Benefit Index	(younger) Age (.00) (more) Innovations (.06) (less) newspaper use (.01)	R^2 = .35 P = .00
Info-seeking Value Index	(younger) Age (.00) (less) Income (.02) (fewer) contacts (.01) (more) market info interest (.01)	R^2 = .38 P = .00
Decision-Making Value Index	(younger) Age (.01) (less) Income (.03) (more) Innovations (.07)	R^2 = .21 P = .02
Electronic Newspaper Value Index	(more) Innovations (.05) (less) newspaper use (.05) (more) news interest (.00)	R^2 = .23 P = .00

TABLE THREE

Correlates (Pearson r) of Self-Reported Problems

	Too much Detail	Not easily Understandable	Difficulty using Indexes
	Mean = 1.54 S.D. = 0.71 N = 87	Mean = 1.46 S.D. = 0.70 N = 87	Mean = 1.93 S.D. = 0.82 N = 87
Demographics			
Age	.21*	-.08	.33
Family Income	.10	-.04	.19
Innovations	.02	.03	.14
Education	-.11	.05	-.05
Communication Behavior			
Newspaper Use	.26	.03	.29
Radio Use	.07	.03	.13
Magazine Use	-.02	.06	.24
Agribusiness Contacts	-.13	.30	.15
Information Needs			
News interest	-.01	.16	-.02
Market information Interest	.08	-.01	-.05
Satisfaction with other Sources	.09	-.20	.17

*For n=87, statistical significance at the .05 level requires r=.18

TABLE FOUR

Summary Stepwise Regression Results for Problems

Problem Measure	Significant Predictors	R^2 and P-Value and overall equation
Too much detail	(older) Age (.06) (more) newspaper use (.02)	R^2 = .15 P = .18
Not easily understandable	(more) Ag contacts (.00)	R^2 = .15 P = .10
Difficulty using Indexes	(older) Age (.00) (more) Innovations (.04) (more) Newspaper use (.02)	R^2 = .25 P = .00

TABLE FIVE

Correlates (Pearson r) of System-Monitored Usage

	Total System Usage	Market Info. Usage	News Usage
	Mean = 225.75* S.D. = 183.26 N = 87**	Mean = 45.64 S.D. = 47.85 N = 87	Mean = 43.93 S.D. = 61.27 N = 87
Demographics			
Age	-.16***	-.25	.02
Family Income	-.06	-.26	.01
Innovations	-.04	.11	-.17
Education	.01	.13	-.07
Communication Behavior			
Newspaper Use	-.08	-.21	-.08
Radio Use	-.14	-.10	-.08
Magazine Use	.02	-.02	.04
Agri-business Contacts	-.13	-.12	-.15
Information Needs			
News Interest	.15	.00	.32
Market Info. Interest	.07	.16	-.02
Satsifaction with other Sources	.01	.04	.02

* Usage statistics are in minutes recorded across 87 days
** Statistics have been computed for the 87 system users previously analyzed.
*** For n=87, statistical significance at the .05 level requires r=.18.

TABLE SIX

Summary Stepwise Regression Results for Usage

Usage Category	Signnificant Predictors	R^2 and P-Value of overall equation
Total usage	(none)	R^2 = .09 P = .51
Market Info usage	(younger) Age (.05) (less) Family Income (.02) (fewer) Ag Contacts (.05)	R^2 = .19 P = .01
News usage	(fewer) Innovations (.05) (more) News Interest (.00)	R^2 = .18 P = .02

TABLE SEVEN

Summary of Regression Results for Benefits With Use as Independent Variable

Benefits Index	Significant Predictors	R^2 and P-Value of overall equation
General Benefit Index	(more) use of the system for markets (.00) (younger) Age (.00) (less) newspaper use (.03)	R^2 = .39 P = .00
Info-Seeking Value	(more) use of the system for markets (.00) (younger) Age (.00) (fewer) Ag contacts (.03)	R^2 = .40 P = .00
Decision-Making Value	(more) use of the system for markets (.00) (younger) Age (.03)	R^2 = .23 P = .01
Electronic Newspaper Value	(fewer) Innovations (.05) (less) newspaper use (.05) (more) interest in news (.01)	R^2 = .23 P = .01